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IS 6609-2-3 (1980): Methods of test for commercial blasting explosives and accessories, Part II: Explosives, Section 3: Explosives, slurry [CHD 26: Explosives and Pyrotechnics]



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Indian Standard

METHODS OF TEST FOR
COMMERCIAL BLASTING EXPLOSIVES
AND ACCESSORIES

PART II EXPLOSIVES

Section 3 Explosives, Slurry

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METHODS OF TEST FOR COMMERCIAL BLASTING EXPLOSIVES AND ACCESSORIES

PART II EXPLOSIVES

Section 3 Explosives, Slurry

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(Continued on page 2)

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(Continued from page 1)

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Indian Standard

METHODS OF TEST FOR COMMERCIAL BLASTING EXPLOSIVES AND ACCESSORIES

PART II EXPLOSIVES

Section 3 Explosives, Slurry

0. F O R E W O R D

0.1 This Indian Standard (Part II/Sec 3) was adopted by the Indian Standards Institution on 7 November 1980, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

0.2 Test methods for nitroglycerine based commercial explosives have already been covered in IS : 6609 (Part II/Sec 1) - 1973* and IS : 6609 (Part II/Sec 2) - 1974*. During the last two decades a new type of water gel and other slurry explosives have come into market. Such water gel and other slurried explosives are different from the NG-based explosives. It is with this intention that a set of additional methods is being formulated to help the manufacturers and users to assess the quality of these products.

0.3 The impact and frictional sensitivity tests prescribed in **3.4** and **3.5** of IS : 6609 (Part II/Sec 1) - 1973* cannot be entirely applied for these type of explosives. The new methods will be added as and when their data becomes available.

0.4 Similarly test method for under water energy measurement is under study and will be added later.

0.5 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960†.

*Methods of test for commercial blasting explosives and accessories: Part II Explosives:

Section 1 Explosives, general

Section 2 Explosives, permitted.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part II/Sec 3) prescribes the methods of test for water gel and other slurry explosives used for commercial blasting purposes.

1.1.1 Test methods for air gap sensitivity; velocity of detonation (using microtimer); velocity of detonation (by Dautriche method); velocity of detonation under steel tube confinement; waterproofness; strength (Trauzl lead block method) which are prescribed at **3.6, 3.7, 3.8, 3.9, 3.10** and **3.12** respectively of IS : 6609 (Part II/Sec 1)-1973* and gallery test as prescribed in **3** of IS : 6609 (Part II/Sec 2)-1974* are also applicable to slurry explosives in addition to those prescribed in this standard.

2. RIFLE BULLET TEST

2.0 General — The object of this test is to determine the sensitivity of explosive to shock and impact.

2.1 Procedure — Take 75 mm cartridge of the explosive under test and tie a mild steel plate $100 \times 100 \times 12.5$ mm on one side. Mount this cartridge vertically on wooden block such that the steel plate is to the back of the cartridges and away from the marks man. From range of 22.5 metres fire a rifle bullet from behind a safety shield from a rifle with a bore of 7.62 mm and velocity of 826 ± 9 m/s through the cartridge and the steel plate.

2.1.1 Examine whether the cartridge has detonated or not. Carry out the test with the cartridge primed by a detonator or primer cartridges as the case may be depending upon whether it is a cap-sensitive or booster sensitive explosive.

2.2 Precautions

2.2.1 While carrying out the test, follow all the safety precautions for shot firing as enumerated in the various tests in IS : 6609 (Part II/Sec 1)-1973* and IS : 6609 (Part II/Sec 2)-1974*.

2.2.2 Carry out the test in a barricaded location with a protective wall behind the charge and fire the rifle from behind safety shield/protective wall from a distance of at least 50 m to ensure adequate safety of personnel carrying out the test.

*Methods of test for commercial blasting explosives and accessories: Part II Explosives:

Section 1 Explosives, general

Section 2 Explosives, permitted.

2.2.3 After firing of the rifle, wait for at least 10 minutes. Observe through a spotting telescope before approaching the test sample.

2.2.4 The explosive to be tested should be kept in a polyethylene bag and in no case any metallic containers to be used.

2.2.5 Examine if the explosive has detonated (this is judged from the sound on firing of the rifle, disappearance of the test sample, damage to the steel plate, etc).

2.2.6 In case of failure to detonate, dispose off the explosive following the usual shot-firing procedures.

3. THERMAL STABILITY TEST

3.0 General — The test ensures stability of slurry explosives under storage at normal as well as elevated conditions of temperature and humidity.

3.1 Procedure — Cartridges of explosives are stored under the conditions specified below. For safety reasons, particularly with new formulations, the cartridge size should be small, say 5 to 6 mm diameter so that even if there is any decomposition during storage under elevated conditions, it does not lead to detonation/explosion:

- a) At $27 \pm 2^{\circ}\text{C}$ under normal humidity conditions,
- b) At 50°C in a thermostatically controlled chamber, and
- c) At 50°C and 25°C alternately for a period of 12 hours in a thermostatically controlled chamber.

3.2 Observations — In all the above storage conditions, loss of mass, change in density, appearance and consistency of the product shall be noted periodically followed by firing tests as prescribed in 3.1.2 of IS : 6609 (Part II/Sec 1)-1973*.

3.2.1 Examine the storage samples for any abnormal gassing, heat rise, gel breakdown, etc, and remove all samples which show any abnormality.

3.2.2 Dispose off suitably any explosive which shows any abnormality during storage study.

4. TEST FOR SENSITIVITY TO INITIATION

4.1 General — The object of this test is to check the sensitivity of the explosive to initiation by: (a) detonator, (b) detonating fuse, and (c) booster, as required.

*Methods of test for commercial blasting explosives and accessories: Part II Explosives, Section I Explosives, general.

4.2 Procedure

4.2.1 For Initiation by Detonator — Determine the minimum strength detonator required for complete initiation of the explosive at ambient temperature for a given charge/size of the explosive. Repeat this test at various time intervals. This test is applicable only for cap-sensitive explosives.

4.2.2 For Initiation by Detonating Fuse — Determine the ability of the explosive to be initiated by a piece (15 cm) of detonating fuse tied to the cartridge and primed.

4.2.3 For Initiation by Booster (for Non-cap Sensitive Explosives) — Determine the smallest charge of initiating explosive or booster for the given mass of explosive (0.5 kg, 2 kg, etc) up to the longest storage in months.

4.2.4 The precautions as specified in IS : 6609 (Part II/Sec 1)-1973* on short firing shall be applicable to this test also.

*Methods of test for commercial blasting explosives and accessories: Part II Explosives, Section 1 Explosives, general.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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